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CYLINDRICAL ALKALINE BATTERY

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[There are no amendments to this patent.]

Abstract

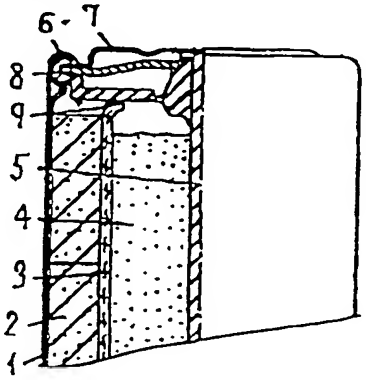
Objective

[This invention] aims to prevent a decrease in the capacity and a drop in voltage and to prevent internal short-circuiting caused by short-circuiting of the positive and negative electrodes when a strong impact is received such as dropping or vibrating of a cylindrical alkaline battery.

Constitution

Adhesion of gasket (6) and separator (3) is improved by coating a sealing agent with adhesive properties on contact part

(9) of the separator opening end face and gasket (6) in a cylindrical alkaline battery, and internal short-circuiting generated by negative gelled zinc electrode (4), in which the positive electrode active material scatters and reaches positive electrode composite agent (2), can be prevented.



9－ガスケットとセパレータ開口部端面との接触部
①

Key: 1 Contact part of gasket and separator opening end fare

Claims

1. A cylindrical alkaline battery in which the contact part of the gasket and separator opening end face are sealed in a battery [sic] in which a positive electrode composite agent, a bottom-appended cylindrical separator, and a negative electrode zinc are successively arranged within a positive electrode case, stored in a power-generating element, and sealed with a gasket.

2. A cylindrical alkaline battery in which the contact part of the gasket and separator opening end face are sealed with an adhesive sealing agent in a battery in which a positive electrode composite agent, a bottom-appended cylindrical separator, and a

negative zinc electrode are successively arranged within a positive electrode case, stored in a power-generating element, and sealed with a gasket.

3. A cylindrical alkaline battery described in Claim 2 in which said sealing agent is a sealing agent which uses polyolefin polymer or polyamide polymer as the main component.

Detailed explanation of the invention

[0001]

Industrial application field

Said invention relates to short-circuit prevention of the positive and negative electrodes in a cylindrical alkaline battery.

[0002]

Prior art

In a cylindrical alkaline battery, a ring-shaped positive electrode composite agent is press-fit and stored along the inside of the positive electrode case, and a prescribed amount of negative gelled zinc electrode is injected via a separator inside said positive electrode composite agent; then the battery can opening is sealed with a gasket or a terminal plate is used.

[0003]

Figure 1 is a half cross-sectional figure of a conventional alkaline dry battery, and (1) is the positive electrode case which is also the positive electrode terminal. Gelled ring-shaped positive electrode composite agent (2) composed of graphite and manganese dioxide is press-fit into said positive electrode case (1). (3) is the bottom-appended cylindrical separator and negative zinc electrode (4) with mixed and dispersed zinc alloy powder in a gelled alkaline electrolyte filled on the inside. (5) is the negative electrode collector ring, (6) is the gasket which seals the positive electrode case opening, and to this gasket (6), bottom plate (7), which is also the negative electrode terminal, is arranged along with metal washer (8) by being welded to the top of said negative electrode collector ring (5). Then the opening of said positive electrode case (1) is sealed on the inside with caulking.

[0004]

Problems to be solved by the invention

However, in said conventional structure, there is a problem of the negative gelled zinc electrode which is the negative electrode active material scattering and reaching the positive electrode composite agent and causing a decrease in the capacity and a drop in the voltage by internal short-circuiting due to the

gap in the contact part of the gasket and separator opening end face when a strong impact such as dropping, vibration, etc., is received.

[0005]

Therefore, a method for cutting off the opening of the separator by contracting and tightly fitting to the inside along the internal face by providing a skirt part or inverse V-shaped cross-sectional part to the peripheral part on the side the gasket which contacts the separator opening end face is being used (e.g., Japanses Kokai Patent Application No. Hei 1[1989]-225061 and Japanese Kokai Patent Application No. Sho 62[1987]-274549).

[0006]

However, the effective capacity inside the battery decreases when an inverse V-shaped cross-sectional part and skirt part are provided to the gasket, and there is the problem of inviting a decrease in the leak-proofing property from decrease in the airtightness or decrease in the capacity from reduction in the filling amount of the active material.

[0007]

Said invention solves said problems in the conventional technology and said conventional problems are solved by improving the adhesive properties of the separator and the gasket.

[0008]

Means to solve the problems

A cylindrical alkaline battery in which a positive electrode composite agent, a bottom-appended cylindrical separator, and a negative gelled zinc electrode are successively arranged from the outside within a positive electrode case, stored in a power-generating element, and sealed with a gasket is characterized by the fact that the contact part of the gasket and separator opening end face are sealed, or said contact part is sealed with a sealing agent having adhesive properties.

[0009]

By it, the sealing property of the gasket and the separator improves and can achieve prevention of internal short-circuiting. The sealing agent is a sealing agent having adhesive properties and it is preferable to use polyolefin polymer or polyamide polymer as the main component.

[0010]

Function

With the constitution of said invention, it is possible to improve the adhesive properties of the gasket and the separator, prevent the negative gelled zinc electrode which is the negative electrode active material from scattering and reaching the

positive electrode composite agent, and prevent a drop in the voltage and a decrease in the capacity. Furthermore, effectively utilizing the internal capacity of the battery effectively becomes possible.

[0011]

Application examples

Below, the alkaline dry battery in the application examples of said invention will be explained according to the figures.

[0012]

Application Example 1

Figure 2 is an enlarged figure of a half cross section near the sealing member of alkaline dry battery (LR20) applied with a coating of a sealing agent having adhesive properties in this application example. Ring-shaped positive electrode composite agent (2) is press-fit along the inside of positive electrode case (1), and after injecting a prescribed amount of negative gelled zinc electrode (4) via the bottom-appended cylindrical separator (3) into the inside of said positive electrode composite agent, a sealing agent of polypropylene polymer was coated on contact part (9) over the entire circumference of the opening end face of said separator (3) contacting the internal face of gasket (6), and composed alkaline dry battery (LR20) shown in Figure 2.

[0013]

Application Example 2

Ring-shaped positive electrode composite agent (2) was press-fit along the inside of positive electrode case (1), and after injecting a prescribed amount of negative gelled zinc electrode (4) into said positive electrode composite agent (2) via bottom-appended cylindrical separator (3), a sealing agent of polyamide polymer was coated on contact part (9) over the entire circumference of the opening end face of said separator (3) contacting the internal face of gasket (6), [thereby] composing alkaline dry battery (LR20) in the same manner as Application Example 1.

[0014]

Application Example 3

Ring-shaped positive electrode composite agent (2) was press-fit along the inside of positive electrode case (1), and after injecting a prescribed amount of negative gelled zinc electrode (4) inside said positive electrode composite agent (2) via bottom-appended cylindrical separator (3), a sealing agent of polypropylene polymer was coated on contact part (9) of gasket (6) and separator opening end face, composing alkaline dry battery (LR20) in the same manner as Application Example 1.

[0015]

Application Example 4

Ring-shaped positive electrode composite agent (2) was press-fit along the inside of positive electrode case (1), and after injecting a prescribed amount of negative gelled zinc electrode (4) into said positive electrode composite agent (2) via bottom-appended cylindrical separator (3), a sealing agent of polyamide polymer was coated on contact part (9) of gasket (6) and the separator opening end face, composing alkaline dry battery (LR20) in the same manner as Application Example 1.

[0016]

Comparative Example 1

Alkaline dry battery (LR20) similar to Application Example 1 was composed, with the exception that a sealing agent was not coated on the gasket side and the separator side.

[0017]

Evaluation of the drop in voltage after the vibration test and after the falling test was made regarding 100 each of said alkaline batteries. After dropping each battery 10 times in the horizontal direction [sic; may refer to orientation of battery] from height of 1 m, the open-circuit voltage of the battery was measured. The vibration test was performed for 90 min at a

vibration frequency of 16.7 Hz and vibration amplitude of 0.75 mm. The results are shown in Table I as the number of batteries with open-circuit voltage of 1.0 V or below after the respective tests. As a result of having made an analysis regarding batteries with open-circuit voltage of 1.0 V or below, it was verified for all batteries that it is internal short-circuiting of the negative gelled zinc electrode which is the negative electrode active material scattering and reaching the positive electrode composite agent.

[0018]

Table I

	落下試験後 (1)	振動試験後 (2)
実施例1	0	0
実施例2	0	0
実施例3	0	0
実施例4	0	0
比較例1	12	15

(3) (4)

(n = 100)

Key: 1 After the falling test
2 After the vibration test
3 Application Example
4 Comparative Example

[0019]

As is apparent from the results shown in Table I, by coating a sealing agent having adhesive properties on the opening end face over the entire circumference of the separator contacting the internal face of the gasket or coating a sealing agent having adhesive properties on the contact part of the gasket and the separator opening end face in accordance with said application examples, the adhesive properties of the gasket and separator improved, the negative gelled zinc electrode which is the negative electrode active material was prevented from scattering and reaching the positive electrode composite agent, and the drop in the voltage and decrease in the capacity.

[0020]

All that is necessary as the sealing agent is that it be a sealing agent having adhesive properties for increasing the adhesion at the contact part between the separator opening and the gasket, but a sealing agent with alkaline proof polyolefin polymer or polyamide polymer as the main component used in the application examples is preferable.

[0021]

Effects of the invention

As noted above, according to said invention, by coating a sealing agent having adhesive properties in at least the opening

end face of the separator making contact with the inside face of the gasket or coating a sealing agent having adhesive properties at least on the contact part of the gasket and the separator opening end face, the adhesive properties between the gasket and the separator are improved, the negative gelled zinc electrode which is the negative electrode active material is prevented from scattering and reaching the positive electrode composite agent, and the drop in voltage or decrease in capacity caused by internal short-circuiting can be prevented.

Brief explanation of the figures

Figure 1 is a cross-sectional figure of conventional alkaline dry battery (LR20).
Figure 2 is an enlarged figure of a half cross section near the sealing member of alkaline dry battery (LR20) applied with a coating of the adhesive sealing agent of said application example.

Explanation of the codes

1 Positive electrode case
2 Positive electrode composite agent
3 Separator
4 Negative gelled zinc electrode
5 Negative electrode collector ring
6 Gasket
7 Bottom plate
8 Metal washer
9 Contact part of the gasket and separator opening end face

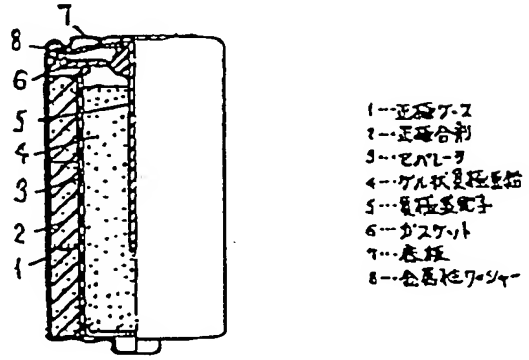


Figure 1

Key: 1 Positive electrode case
2 Positive electrode composite agent
3 Separator
4 Negative gelled zinc electrode
5 Negative electrode collector ring
6 Gasket
7 Bottom plate
8 Metal washer

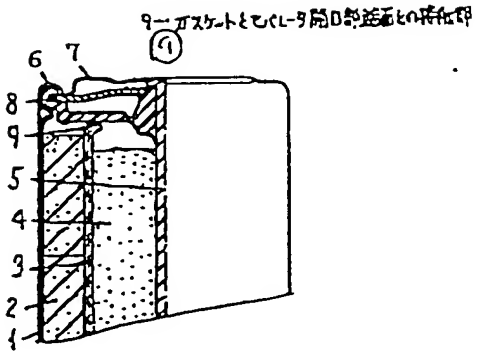


Figure 2

Key: 1 Positive electrode case
2 Positive electrode composite agent
3 Separator
4 Negative gelled zinc electrode
5 Negative electrode collector ring
6 Gasket
7 Bottom plate
8 Metal washer
9 Contact part of gasket and separator opening end face

Japanese Kokai Patent Application No. Hei 7[1995]-134977

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